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MEN AND BOOKS

JEAN FERNEL

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FOUR HUNDRED YEARS AGO the scientific world was without form and void. The spirit of Aristotle and Galen brooded over the waters and Man, the microcosm, stood in the centre of the nine-fold shell of the macrocosm.

The new learning was slowly spreading across Europe but, in France Duns Scotus, one of the nineteen Scots who, at one time or another was rector of the Sorbonne, was resisting its advance. The scholarship of the time paid no attention to science. Aristotle had settled all the problems and Hippocrates, elaborated by Galen, was the ultimate authority in medicine. Astrology had not yet become aware of astronomy and had yet a hundred years to dominate and, even later, to modify medical practice. Alchemy lived in its secret laboratories and its votaries recorded their experiments in code lest their researches might be used by rivals, as they all sought for a method of transmuting base metals into precious gold or of discovering the seed out of which gold should grow. Avarice was the motive of all their labours. Magicians, despite the anathema of the church, were feared and respected by both the learned and unlearned.

Chemistry was not yet conceived, much less born. Astronomy had just begun its feeble infancy and was left an orphan when its author died. Galileo was not yet born. Bombastus the Paracelsus was defying Galen by advocating mercury as a treatment for the endemic disease which had been given its new name in 1530 by Frascatorius who coined the term syphilis from "sus" and "philos" to indicate its beastliness. At the beginning of the sixteenth century the science of medicine had shrunken into a mummified corpse. In fifty years it began to show signs of returning life and I propose to introduce to you a man prominent among those who had to do with its revivication—Jean Fernel of Paris (1495-1558).

My interest in Jean Fernel was awakened by reading the Gifford lectures of 1935 delivered by Sir Charles Sherrington, the subject being Man on His Nature. These lectures constitute a profound study of the evolution of man, and Fernel is used as an exponent of the most advanced ideas prevailing in the first half of the sixteenth century. To Fernel there was no such thing as evolution either of body or of mind. "Sol et homo generant hominem" was his conclusion. Forty days after conception the human fetus was prepared to receive the soul as taught by the Church, or the innate heat which came from the heavenly places and controlled every thought and action until it left the body and returned to its source. This idea was accepted without question until Descartes, a hundred years later, argued that muscles moved by impulses originated in the body itself. Harvey's discoveries confirmed the theories of Descartes.

Evolution of mind is another matter. Sherrington believes it but is unable to demonstrate it. Sir Russell Brain in his book issued last year—*Perception, Mind and Science*—has to conclude that mind cannot be explained by physiology. The B.B.C. lectures of last summer on Science and Religion fail to demonstrate mind as a physical process despite the wonderful studies in cybernetics which have produced the marvelous computing machines in which memory is mimicked and the most complicated mathematical problems are solved. Brain cannot concede to electronics the process of perception much less the formulation of concepts and ideas.

Sherrington wrote a biography of Fernel based upon a short account written by Plancy ten years after Fernel's death and an essay by Jean Gaulin (1728 to 1799). Plancy lived in Fernel's house for ten years and was his profound admirer.

Fernel was born, according to Gaulin's estimate, in 1495. His family derived from Amiens but his father lived in Montdidier and the son got his schooling in Clermont. In the titles of the books he wrote he is "Ambianus" or from Amiens. With the full approval of his father and the doubtful acquiescence of his mother he entered the College of St. Barbe. This was a progressive centre and was one of the sixty-eight colleges in the University of Paris that were founded before 1500. It dates from one hundred years earlier. The head of the college was Jacques Govea whose son André succeeded him. Montaigne refers to André, then in Bordeaux, as the greatest teacher in France. St. Barbe numbered among its students in Fernel's time Ignatius Loyola and John Calvin. Sherrington makes only brief allusion to the latter, merely mentioning him as being a student, and the remark "later he became a protestant". Loyola was under a vow of poverty and had rather a hard time of it. St. Barbe was, perhaps, progressive but in view of what is to follow it does not seem to have excelled.

The Sorbonne was the citadel of the Church in the community of colleges. It felt the stirrings of the Humanist movement to the extent that in 1470 it imported two printers and published a few books as contributions to the new learning. A year later the rector was called away, the publications did not pay and the printers set up business on their own account in Rue St. Jacques which, in the next fifty years became the street of the publishers some of whom like Colines, came to rival the great Aldine press in Venice. They were early imitators of Aldus in making books smaller than the folio size of most incunabula.

Successive rectors, notably Duns Scotus, resisted the new learning as a threat to their estab-

lished teaching of divinity. Just how far St. Barbe was liberal in its ideas is hard to say but it could not have been to any great extent. The advance in humanism was fostered, not in the universities but in the courts of princes and nobles. In 1530 Francis I of France created the Royal College and in it were chairs of Greek and Hebrew. Science was not a university concern at all excepting for mathematics, and this included astrology. The humanist movement did nothing to improve this situation.

Plancy is very bitter about the sort of teaching in the university and tells us that when Fernel was awarded a master's degree in 1519 he felt himself to have been but poorly educated. He refused a lectureship in St. Barbe and retired for fifty years to correct the fault. He read Cicero, Plato and Aristotle and began to publish books, none of which are now extant, on mathematics. He taught Destresby, a foremost scholar, mathematics in return for lessons in the humanities and, as a result, his writing improved in style and lucidity of expression. He was a "star gazer" and invented an astrolabe which was improved by another man a little later. He taught a few pupils, among whom was Plancy. He lived this ivory tower existence until 1524 when his father found it impossible to continue his support. He had married in the meantime and was spending his wife's dowry on his hobbies when his father-in-law interfered. He was obliged to look for an occupation that would earn a living for himself. He discharged his instrument makers and sold his equipment and then he was laid low by a quartan fever and had to go to the country for some months. This experience determined his choice of medicine as a career.

In 1526 he was enrolled as a student in medicine. He supported himself and his family by teaching and by publishing studies in mathematics which, of course, included astrology. None of these earlier works are now extant. He probably had his introduction to anatomy by attending the occasional public demonstrations of pre-Vesalian times but there would appear to have been opportunities for private dissections as well. Paré was practising embalming early in the second half of the sixteenth century and this is noted in such a way as to suggest that it was a common procedure. Fernel did not have to depend upon freshly strangled criminals for his material. King Francis I was interested in anatomy and, to settle a controversy as to the existence of the hymen in virgins, provided the body of a deceased nun to settle the dispute. Fernel evidently had ample opportunity for dissection. One of his notes reads "medulla spinalis cava est". This seems to have escaped notice by Vesalius.

Vivisection was done on occasion. Fernel observed that when the ventricle of the left heart was in systole the aorta was in diastole. How nearly he escaped anticipating Harvey by a hundred years! Festus said to Paul, "much learning hath made thee mad". In Fernel's case much learning had made him blind. He knew so well the function of the heart as it was explained in ancient texts that he invented another fanciful idea to explain the phenomenon he had observed. In 1552 Paré was using the ligature to control hæmorrhage from spurting arteries but physicians were not to be taught by surgeons. Paré's work was known because it was in answer to the fulminations of a physician who published an argument extolling the virtues of the cautery and the vices of the ligature that brought forth Paré's famous reply in 1564. Fernel's observation and Paré's practice made the circulation of the blood a fact to any intelligent scientist who was aware of both. For want of such a scientist the world had to wait a century for Harvey.

In 1530 Fernel graduated as a physician and began his practice in Paris. Prince Henry offered him an appointment as court physician but Fernel tactfully declined the honour. He became a keenly observant clinician. Gradually it dawned upon his mind that the progress of a disease often and, indeed, usually failed to correspond with the relation of the planets to one another at a given time. There was no violent repudiation of astrology. It just faded gradually out of his habits of thought. When Cardan on his way to Scotland visited him there was no heated argument. Cardan went on with his horoscopes and Fernel continued to disregard them. A century later Harvey and Sir Thomas Browne were still believers in astrology and a professional astrologer was a member of the Royal Society of England.

Early in his practice Fernel conceived the idea of systematizing medical teaching and planned his work in seven volumes. The whole work was to be entitled *De Naturali Parte Medicinæ*. The first of these volumes was on anatomy and it differed from the *Fabrica* of Vesalius, soon to appear, in having no illustrations. These would be, to Fernel's way of thinking, a disadvantage. The student would read the text and go to a cadaver to see for himself instead of poring over a drawing. The better the picture the worse for the student. This work preceded that of Vesalius by two or three years but was promptly eclipsed by the latter when it appeared in 1543.

The second volume gave its author a harder task. He wrote: "in passing from anatomy to physiology—that is the actions of the body—we pass from what we can see and feel to what is known only by meditation." The scholar is back to his library and the scientist is on vacation!

The meditation resulted in a restatement of the humoral theory. Cardan had rejected one of the four elements but Fernel clung to them all. The "fire" that Cardan had eliminated was the innate heat that came from the sun to animate the brain and warm the heart. Fernel had put a

finger into a living heart and found it hotter than any other place in the body. Therefore he knew that the ventricles contained blood. "None are so blind as those who will not see!"

He sought to make the old system more comprehensible and succeeded in making it a little more complex. The four elements were vehicles for the four qualities. The temperaments resulted from variations in the proportion among the qualities. The four humours were the results of the elements and qualities and they determined the temperaments. Added to these were the three coctions. The first changed food into chyle. The second or great coction manufactured the blood and the third changed blood into flesh. It is in considering the second coction that Fernel has an inkling of fact and introduces a new function of the liver. He supposes fermentation as the process of turning chyle into blood. The blood flows outward by the veins and the tissues are endowed with a faculty of attraction by which they absorb blood by sucking it through invisible openings in the walls of the veins.

It would be tiresome to pursue this elaborate hypothesis further. It is summarized in *The Anatomy of Melancholy* from Fernel and his commentators and makes strange reading. When Harvey proved the circulation of the blood Fernel's physiology ceased to be authoritative. After its publication had reached a hundred editions it faded from the lists of textbooks in the schools of medicine in Europe. The pathology however went on and on. It was revised thirty-six times in a century. Boerhaave held it as the best available treatise and the Dean of the Paris Faculty names it in 1660 as the standard text. The other volumes are not so well known. The therapeutics was not finished when Fernel died.

To gain some idea of the daily life of our subject we quote from Plancy who apologizes for his hero by alluding to diagnosis by inspection of urine as "the custom of physicians wrong and base as we must admit it was".

"Rising about 4 o'clock every morning he went from his bedroom to his library. Then he looked over some page of text of the ancient masters either because he did not feel satisfied about it or that he did not sufficiently remember it or in order to add something by way of commentary. After that, with the coming of daylight he went out to his public lectures or to visit his patients. Then it was that urines were brought to him and he would inspect them. . . . Back again for his meal he would retire to his library while dinner was being prepared and, when dinner was over, returned thither again until the time for resuming his visits. It was the same before supper. After supper he returned to his study and did not retire until 11 o'clock."

His wife persuaded him to buy a place in the country but only once or twice a year would he retire there. He just worked an average of 18 to 19 hours a day!

Another quotation from Plancy throws some light upon the character of the man.

"When he was called to visit a man of parts, after he had diagnosed and prescribed, he liked—time and the state of the case permitting—to enter into talk with him; with a philosopher on philosophy, with a mathematician on mathematics, with a commander or a soldier on the sites of towns, the rivers on which they stand or engines of war and their invention, with a sailor on navigation and newly discovered lands, with a theologian on God and the things of Heaven, with a business man on commerce. In these talks he would continue, as occasion offered, to bring forward some comforting assurance and fortify the patient's hopes. And he would relieve a serious theme with touches of humour to lighten it. All this gained him respect and liking from everyone and he was esteemed a man of geniality and wit."

In the last two years of his life Fernel could not escape the consequence of his reputation. He was called to the court of Henry II. For a year Fernel marched with the king but never let a day pass without writing something on a medical topic. He had completed his work on The Treatment of Fevers before the conquest of Calais allowed the King to return to Paris. With him came Fernel who, this time, took his wife with him. She did not bear the uprooting from her home. After a few days she developed a continued fever and on the twentieth day of the illness she died delirious and convulsed. Twelve days after the burial of his wife Fernel himself was laid low. The King saw to it that the best physicians gave their help but the patient himself studied the case and prepared remedies. "And, by Hercules, on the seventh day the urine cleared and febrile symptoms became less severe" (Plancy). On the eleventh day the fever flared and the sick man, noting the bad state of the urine, gave an unfavourable prognosis. He had always been temperate in his living and his urine was well diluted with water. For two years he had a sense of acidity in the mouth and throat which did not yield to any treatment. The diagnosis before he died on the eighteenth day of his illness was splenitis—"the humour gathered in the spleen at length heating and decaying produced an inflammation of that organ". Autopsy confirmed the diagnosis, "for that organ (the spleen) was markedly swollen and was livid and greenish and, when cut with a scalpel, a lot of sanious matter as black as pitch came from it".

Physiology has come a long way from the strange conceptions of Fernel and the equally strange ideas of Descartes a century later. Descartes knew what we do not know—the function of the pineal gland. It acted as a floating valve to the third ventricle and it could be of use to a student. By sitting with the head bent forward the spirits in the ventricles flowed more freely and thought was facilitated.

When the first republic of France was proclaimed the endowments of the universities were confiscated and Les Ecoles de Santé set up in the year III of the new order which presumed for a time to date events from its bloody triumph. In our reckoning it was the year 1794. A medal was struck as a reward for distinction in the new course of medicine combined with surgery. The

Canad. M. A. J.
April 1953, vol. 68

obverse shows portraits of Fernel and Paré as typifying the flower of attainment in their respective fields in the history of medicine and surgery in France.

The known works of Fernel number 135 of which some have been lost and many are very rare. There are examples in the library of the Academy of Medicine of Toronto. That he was widely read we may infer from numerous quotations in Burton's *Anatomy of Melancholy.*

ASSOCIATION NOTES

TRANS-CANADA MEDICAL PLANS*

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Trans-Canada Medical Plans was conceived in Montreal in June, 1951 after a two day conference of representatives from several prepaid medical care plans across Canada, under the Chairmanship of Dr. C. C. White. Discussions had gone on for four years prior to this at annual meetings of representatives, but until 1951 an apparent sterility had been the result and in reviewing these meetings, the apparent cause of the sterility was a constant failure to be able to produce a plan which would have uniform benefits and uniform rates across Canada.

In 1951 the thinking changed somewhat and it was decided to form Trans-Canada Medical Services to co-ordinate the activities of the various provincial schemes—but to retain provincial autonomy—and not create a new superscheme. Since June, 1951 there have been four Commission meetings and a meeting of the Executive Committee. These have been held in Montreal, Toronto, Edmonton, Banff and Saskatoon, respectively. A full time Director, Mr. Howard Shillington, has been engaged. The present coverage across Canada and the needs have been studied at considerable length, and much spade work has been done in attempting to get a more universal coverage. A constitution and by-laws have been worked out and revised with many revisions already made as need became evident. A "Dependents of service men Prepaid Care Plan" has been studied at length, and negotiations are in the preliminary stages.

T.C.M.P. today consists of seven Prepaid Care Plans across Canada: other applications are pending and will be considered at this meeting. The total membership of the plans in T.C.M.P. at present is 984,358. During the past year, these plans paid out $15,394,075.68 for medical accounts so you can see that we are already pretty "big business". These plans are all service plans and this is a point we wish to emphasize.

To the best of my knowledge there are only five ways that medicine may be practised and paid for: (1) Private contract. (2) Indemnity plans. (3) Government sponsored plans. (4) Service contract. (5) Private practice.

In looking these over I think we all know most of their advantages and disadvantages. The private contract denies the free choice of doctor, which is one basic principle in which we believe, but it does work adequately in some small isolated communities.

Indemnity plans certainly have a place but do not answer the people's demand for complete coverage. Also, doctors don't particularly favour indemnity plans on a large basis unless the doctors are adequately represented on the governing board, because if over 50% of the people in any area become covered, the doctors tend to lose control of the fee schedule. The schedule the company pays comes more and more to be accepted as the schedule. On a small basis this is not an important factor. They have a place, but certainly are not the full answer from either patient or doctor point of view.

Government-sponsored plans have many advantages and disadvantages and I need not outline many of these for you. However, in most places that this type of plan has been introduced, the free choice of doctor has been lost, or at best there remains a restricted choice. Also the doctor tends to get involved in a lot of red tape and spends too much time filling in papers instead of practising medicine. Also it seems very hard to retain the proper doctor-patient relationship. Again, it usually becomes expensive.

The service contract where the patient's full bill is paid for—on as full a service basis as possible—seems to approach more nearly what both patients and doctors desire. In working out such a scheme the service, as I mentioned, should be as complete as possible, getting rid of all exclusions, if possible, and paying the bills in full. If doctors believe what they say when they say people should be able to prepay for their medical care, then it would seem realistic that this type of plan should be the objective.

The fifth method is that of private practice with the patient paying his own bill. I'm sure many doctors would desire that this method remain as it has been in Canada for many years. However, medical care is becoming very expensive with newer methods of investigation and treatment, etc. Also I believe one must face the fact that the world is changing, with resultant changing philosophies and changing standards of living; with a greater emphasis on security and collectivism and making as much of everything available to as many people as possible; with the cost spread over groups as a whole; in

*Chairman's address at the meeting of Trans-Canada Medical Plans in Montreal, January, 1953.